Wrenwoods Golf Course
Environmental Baseline Assessment
Charleston AFB, SC Jul 04

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Executive Summary

U. S. Air Force GEM Program

The U. S. Air Force Golf Course Environmental Management (GEM) program is a proactive Air Force Center for Environmental Excellence (AFCEE) initiative to foster a better understanding of the environmental challenges facing our golf courses worldwide. Armed with the support and approval of the Air Force Services Agency golf program, AFCEE's goal is to facilitate the creation of an environmentally friendly golf course facility while supporting the installation mission.

The primary tenets of the GEM Program are to minimize or eliminate potential negative environmental impacts, attain and maintain daily compliance with all appropriate regulations, and constantly examine all aspects of golf course management to achieve the highest standards of environmental excellence.

GEM Program process

There are five steps in the GEM program process.

- Analysis
- Documentation
- Implementation
- Evaluation
- Revision

Environmental challenges

The following environmental challenges were identified during the GCEBA process:

- Solid Waste Management Units (SWMUs)
- Wetlands
- Bird/Wildlife Aircraft Strike Hazard (BASH)
- New clubhouse site plan
- Floodplains

Where do we go from here?

Once the environmental challenges are identified, it is paramount that the golf course staff should determine their preferred management approach in the context of their ongoing, long-term goal of providing the best golfing experience for their customer's dwindling recreation resources.

Armed with this well-conceived, golf facility-based management approach, the golf staff should then coordinate with the environmental staff to ensure that there is consistency and compatibility with installation-wide natural resource and environmental management goals and objectives.

Finally, the staff should proceed with the next steps in the GEM Program process documented in this study.

Introduction

The golf course environmental baseline assessment (GCEBA) is the initial step in the process of creating a successful ecosystem-based Golf Course Environmental Management (GEM) Plan.

The intent of the program is to provide an efficient, customer-driven management tool that will free up course managers and superintendents to devote more of their efforts to caring for their customers and the golf course. Properly designed and implemented, the GEM Plan will keep the entire golf facility in compliance with the constantly changing environmental requirements while contributing to the installation's vital recreational opportunities.

The new clubhouse is nearing completion.

Charleston's Wrenwoods GC is teaming with potential at every turn.

Goal of the GEM Program

The goal of the U. S. Air Force GEM program is to facilitate the creation of an environmentally friendly golf course facility for its customers while supporting the installation mission. The Air Force Center for Environmental Excellence (AFCEE) is dedicated to helping to identify ways that more rounds can be played on better-conditioned courses while minimizing or eliminating negative impacts to the environment. In most cases, the U. S. Air Force's golf courses are being managed compatibly with the environment. The GEM program is the vehicle to document our successes while communicating directly with our customers, commanders, and local community.

Work is progressing on the new clubhouse interior.

GEM Program Process

Efficient implementation is the most important aspect of any initiative where practices and procedures are examined and may undergo significant change. This is especially true of the GEM Plan process. The latest requirements for the GEM Plan components are described and outlined on the AFCEE golf course environmental management program website: http://www.afcee.brooks.af.mil/ec/golf/. Detailed explanations and directions for completing the GEM Plan will be delineated in AFCEE's proposed handbook ***Golf and the Environment, Guidelines for the 21st Century***.

The GEM Program is derived from many diverse environmental regimes such as the National Environmental Policy Act, the Environmental Compliance Assessment and Management Program, and the ISO 14001 environmental management system. There are five basic steps in the implementation of the GEM Program process:

- Analysis
- Documentation
- Implementation
- Evaluation
- Revision

This area between the new clubhouse and Arthur Drive would be ideal for a state-of-the-art short game practice facility.

Superintendent Bob Spearman nurtures one of the new greens.

Analysis

Experienced environmental managers realize the importance of assembling all of the data relevant to a problem prior to determining its best solution. Analysis is the first and most important task of the golf course environmental baseline assessment (GCEBA) and the GCEBA is the initial step in the process of creating an ecosystem-based Golf Course Environmental Management (GEM) Plan. Properly completing the GCEBA is paramount to the long-term compatibility of an installation's golf course management practices with the GEM Program, and more importantly, the U. S. Air Force's natural resource and environmental management goals and objectives.

GCEBA COMPONENTS

The GCEBA is comprised of the following components:

- Site visit, interviews, and data collection
- Course specific analysis
- Miscellaneous facility review
- Environmental compatibility quotient checklists
- Identification of environmental management challenges
- Summary report

Documentation

It is not enough just to know how to create a successful golf course environmental management program. There must be a written record documenting existing site data, maintenance practices, pesticide applications, and other historical golf course activities. By documenting what we know, we will be able to determine how to make better decisions in the future. The completed GEM Plan will assist in the daily management of the course while providing a convenient vehicle to communicate to commanders and customers alike the environmental issues that challenge us on our golf course as well as our plans to deal with them. In order to reach the environmental stewardship goals set by the U. S. Air Force, we must consistently employ only those management practices that minimize or eliminate potential negative impacts to the environment.

GEM PLAN COMPONENTS

The GEM Plan will be comprised of the following components:

- GCEBA report
- Map of the entire golf course facility grounds depicting locations of the significant environmental management challenges and the golf course facilities
- Booklet that describes the environmental management challenges on the GEM Plan map
- Specific practices that will be employed by the golf course staff to deal with each environmental management challenge after coordination with and approval by the installation environmental staff
- Compilation of best management practices employed at the golf course in their implementation of the GEM program recommendations

Implementation

Positive and decisive action is the only true measure of the success of a GEM Program. By implementing new practices, whether to knowingly improve the course's role in the environmental stewardship of the installation or to just try new ideas to determine their value, will the golf staff and golfers benefit. The Windy Trails staff should adopt the GEM Program Environmental Policy and immediately begin finding ways to minimize or eliminate any and all negative impacts to the environment.

Evaluation

In order to ensure the highest quality of customer service and environmental stewardship, there must be continual self-evaluation and improvement. There also should be consistent, on-going measurement of the reduction or elimination of environmental impacts the newly implemented practices have on the course. For example, documenting the reduced use of inputs such as fertilizers, pesticides, and irrigation can be used to demonstrate the increased environmental stewardship of the golf course management practices as well as the overall value of the GEM Program. It is important for U. S. Air Force golf courses to show improvement over time. This can be easily accomplished by regularly evaluating golf course maintenance methods, practices, and management approaches to day-to-day issues and changing when appropriate.

Revision

The very nature of a superior GEM program implies that all documents be regularly maintained to represent the most current conditions. U. S. Air Force golf course managers and superintendents should be constantly looking for ways to improve their environmental stewardship. Acting on lessons learned is right behind initial implementation as the most important aspect of a successful GEM Program. The GEM Plan should be kept as current as possible at all times. Ideally, it should be completely updated at least every three years.

Course Specific Analysis

One of the most pragmatic and enjoyable tasks in the GCEBA process is the course specific analysis. From a general overall description of the course to the details of the course's history and makeup to the various observations on the way the course plays, looks, and is managed, the course specific analysis sets the stage for the rest of the GCEBA report. It is comprised of the following tasks:

- Course description
- Course details
- Miscellaneous facilities examination

The 10th hole rewards the accurate driver of the ball.

The existing parking area lacks adequate space.

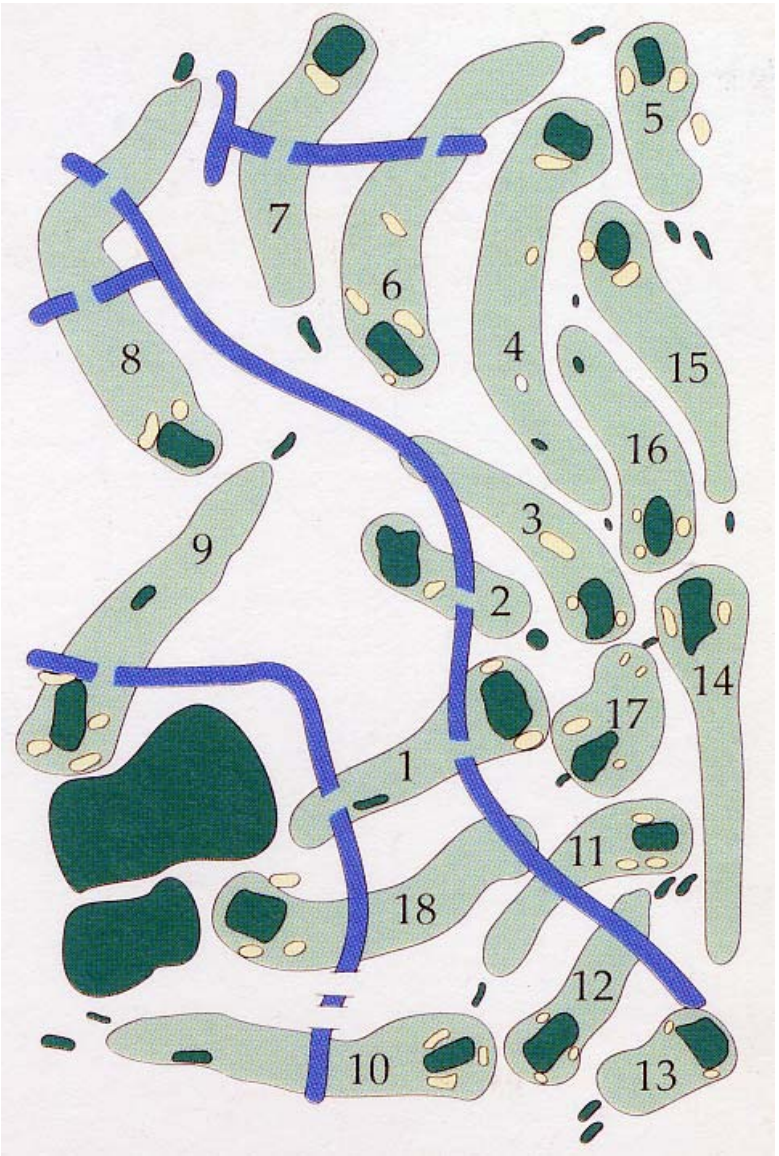
Course description

While blessed with the innate and enticing beauty of hundreds of native pines and oaks, the Wrenwoods Golf Course at Charleston AFB, occupies a relatively flat landscape. Several streams are integrated into seemingly every hole for an additional test to Wrenwoods regulars. The 18-hole layout offers plenty of diversity while achieving traditional playability standards appropriate for all levels. Director of Golf, Karen Harrell, has logged numerous extra-duty hours over the last several years preparing the Charleston AFB golf facility for a long and successful future. Several years in the past, she saw the need for new green surfaces and a clubhouse and, sometime in the fall of 2004, she will finally be able to enjoy the fruits of her labor. The new clubhouse is rapidly progressing toward completion and the final new greens surfaces are approaching playable levels. Things are definitely looking up.

The 14th green at Wrenwoods GC could become the 1st or 10th.

Course details

Architect		E. R. Riccoboni
Year constructed		1954
Climate		Humid
Average annual rainfall		51.4 inches
Average growing season		294 days
Elevation		15-45' MSL
Par		36-35-71
Yardage/Rating/Slope		Blue- 6595/71.6/128
		White- 6216/69.6/123
		Gold- 5605/66.2/113
		Red- 5105/69.1/112
Golf course manager		Karen Harrell
Superintendent		Bob Spearman
Turfgrass	Tees-	Tifgreen/mix
	Fairways-	Common Bermuda/mix
	Greens	Tifdwarf
	Roughs-	Common Bermuda/mix



Existing routing of holes will remain but numbering will change when the new clubhouse is completed.

Wrenwoods Golf Course Aerial Photo

Miscellaneous Facility Review

Although the course is primary to the enjoyment and eventual return of most of Windy Trails' customers, the support facilities play a huge role is the overall success of the operation. This section of the GCEBA will examine the following facilities for their aesthetic, functional, and environmental values:

- Clubhouse/pro shop/snack bar
- Maintenance complex
- Practice areas
- Pesticide mixing and storage
- Cart barn
- Infrastructure

The new clubhouse as seen from the existing 14th hole

New clubhouse will need landscape development, surface drainage improvements, and general site plan refinement.

Clubhouse

The new clubhouse will be a fantastic addition to Charleston AFB and the customers of Wrenwoods Golf Course. Manager Karen Harrell has literally poured her grit and soul into the facility set for a fall 2004 grand opening for the $2.7M. It would be hard to imagine if any detail has managed to elude her in her quest to create the best golf clubhouse, cart storage facility, and driving range possible for her installation and customers. Since the landscape portion of the contract was eliminated during the bid acceptance process, some follow-on work will be required to ensure all effort expended to date are fully realized.

Maintenance complex

The Wrenwoods maintenance complex is functional, clean, and well organized with adequate space for equipment, parking, storage, and administrative/management. Evidence abounds at every turn that Superintendent Bob Spearman runs a professional operation.

The complex has enough room to store all-important equipment.

An uncluttered maintenance yard can be a precursor for the condition of the interior.

This is where the rubber meets the road, the tough get going, the….

Existing driving range will be replaced within clubhouse project.

Practice areas

Currently, Wrenwoods GC has a driving range with little turf, no lights for nighttime practice, and a minimal landing area that creates a safety hazard on the first tee. The putting green and chipping green is located near the existing clubhouse. One or both will eventually be turned into a turf nursery. All of these will be relocated with the new clubhouse project with the exception of the chipping green. Appropriately designed and constructed, the area due east of the new clubhouse along Arthur Street could be used for a new short game practice area.

Pesticide mixing and storage

Superintendent Bob Spearman and his staff have one of the best maintenance complexes observed. Their pesticide mixing and storage facility contributes to this assessment. Fully compliant and sufficiently roomy, these areas provide a safe and functional amenity to the maintenance program at Wrenwoods Golf Course.

Fully compliant, extremely safe, and well organized.

Cart storage facility

The existing cart storage facility is located adjacent to the existing clubhouse. The new clubhouse project will also add a new cart storage facility nearby. The new facility will meet all requirements of caring for the fleet. In addition, it will be architecturally compatible with the new clubhouse helping to create an enjoyable and attractive amenity for the installation as well as Wrenwoods' customers.

Cart storage facility is just beginning to take shape.

Asphalt cart paths are holding up well.

Infrastructure

This section examines important elements of a quality golf course that are difficult to group into another category. Cart paths are in good condition. The new parking lot should be large enough to satisfy the regular demands of Karen Harrell's customers. Landscape development attempts have been well intentioned with mixed results. Wrenwoods should procure a golf course development plan to guide further improvements. There is a site amenity group near most teeing areas and the course signage is acceptable.

Determining the Baseline (ECQ)

The following is a brief compilation of some of the responses in each of the ten Environmental Compatibility Quotient (ECQ) categories obtained in an interview with the superintendent and the manager conducted during the site visit.

ECQ Categories

- Overall Management Philosophy & Documentation
- Safety, Training, And Awareness
- Compliance
- Pesticide Use, Storage, & Handling
- Pollution Prevention
- Conservation Practices
- Water Resources
- Maintenance Practices
- Customer Relations & Education
- Miscellaneous Special Projects & Activities

Key to checklist responses

- **Yes** = Practice is complete or ongoing and can be verified.
- **Partial** = Practice has been initiated but needs further attention and improvement.
- **No** = Practice is not in place.

ECQ Checklists

The Environmental Compatibility Quotient (ECQ) checklists are a convenient method of assessing the overall performance, implementation, and completeness of an installation's Golf Course Environmental Management Plan. The checklists can be used in many ways including:

- As an analytical tool while compiling a Golf Course Environmental Baseline Assessment like this one.
- As a self-assessment tool for the golf course manager or superintendent.
- As an award nomination evaluation by a Golf Course Assessment Team (GCAT).

Detention ponds nearby new clubhouse give Manager Harrell concern for mosquitoes and other unwelcome and undesirable wildlife.

Interpreting the ECQ

The ECQ compiled for an installation's course is a snapshot of the overall performance and compliance with the GEM Plan. There are two measures obtained as a result of using the ECQ checklists to determine the status or quality of the environmental management program: determining the actual and potential environmental compatibility quotients.

- **Actual ECQ-** the total percentage of "Yes" responses for all ten checklists. This number represents the current level of the golf course management practice compatibility with the environment
- **Potential ECQ-** the total percentage of "Yes" responses plus the total percentage of "Partial" responses for all ten checklists. Maybe the most significant measure; the potential ECQ represents a level of compatibility that could be reached by finalizing or fully implementing a particular practice or procedure.

ECQ Scoring Scale

Percent Responses Yes or Partial per Category	Level
93-100%	Advanced
83-92%	Getting there
73-82%	Showing progress
63-72%	Early stages
Less than 62%	Just started

A successful 1st tee landscape development.

There are almost as many different bridges as there are streams.

Overall Management Philosophy & Documentation

#	Environmental Compatibility Indicator	Yes	Partial	No
1	Has management demonstrated that the environment is an important part of their responsibilities by initiating the GEM Planning process?	✓		
2	Has the golf course adopted and posted an Environmental Policy?			✓
3	Is the GEM Plan underway or completed, available, and updated regularly?		✓	
4	Is a map of the property highlighting environmental opportunities or constraints such as water features, sensitive landscapes, threatened or endangered species habitat, special management zones, etc. used in the environmental management decision-making process and is it posted for customers?		✓	
5	Environmental goals, objectives, issues, projects, and progress are evaluated at least annually and are regularly communicated to employees, customers, management, and the local community?			✓
6	Are written records of water quality monitoring activities, results, and control measures readily available?	✓		
7	Is there an inventory of bird and mammal species documented, maintained, and readily available?		✓	
8	Is there a general understanding of how course management practices may positively enhance or adversely impact the environment?	✓		
9	Are the environmental impacts of pest control measures such as leaching and runoff potential, toxicity to non-target organisms, soil absorption capacity, pesticide persistence, water solubility, and effects on soil microorganisms and non-target species considered as part of the course management planning process?	✓		
10	Are records of pest treatments employed and their effectiveness maintained and used to guide future pest control decisions?	✓		
	Point totals for each column	**5**	**3**	**2**

Safety, Training, & Awareness

#	Environmental Compatibility Indicator	Yes	Partial	No
1	All employees are familiar with the overall GEM Plan and are trained on the importance of environmental compliance with the goals and objectives of the program?			✓
2	All appropriate employees are trained to be familiar with U. S. Air Force, federal, state, and OSHA regulations that apply to storage, handling, and disposal of chemicals used on the property?	✓		
3	All employees are aware that chemical use, storage, and disposal and their potential risks to human health and the environment?	✓		
4	All employees are trained to understand that poor management practices may adversely impact worker health, on- and off-site water quality, local soil health, and wildlife species and their habitats?	✓		
5	A current copy of all Material Safety Data Sheets (MSDS) for all chemicals used anywhere on the golf course property is maintained and readily available for use by employees?	✓		
6	All employees receive regular, documented training on all potential OSHA issues?	✓		
7	Are all golf course pesticide applicators active participants in a local respiratory and pulmonary testing program?		✓	
8	Pesticides, fertilizers, and other chemicals are stored on appropriate shelving in an approved storage facility?	✓		
9	Are golfers notified in the pro shop and on the first and tenth tees about the day's planned or recently completed spraying of any chemical or fertilizer that may be hazardous to human health and safety?			✓
10	Are key staff members trained regarding water quality and conservation issues?	✓		
	Point totals for each column - Response percentage	**7**	**1**	**2**

Compliance

#	Environmental Compatibility Indicator	Yes	Partial	No
1	Is fuel storage/delivery managed in accordance with federal, state, and local regulations?	✓		
2	Are installation environmental staff members included in on-going course management discussions and plans at scheduled meetings?			✓
3	Are there regularly scheduled golf course staff meetings to discuss environmental management issues?			✓
4	Does the director of golf and the superintendent attend ESOHCAMP in-briefings and out-briefings?	✓		
5	Does the director of golf and/or the superintendent coordinate with installation environmental staff on the various management plans that affect or include the golf course?		✓	
6	Have all necessary permits been secured and/or updated and their requirements satisfied in a timely manner?	✓		
7	Has appropriate impact analysis (NEPA) been performed on all proposed actions on or affecting the golf course property?	✓		
8	Are containers used to store used oil in good condition, not leaking, and clearly labeled?	✓		
9	Has the golf course staff has submitted their proposed management approach to the identified environmental challenges to the installation environmental staff for coordination and review?			✓
10	Were there less than two major golf course facility-related findings during the last official ESOHCAMP visit?	✓		
	Point totals for each column - Response percentage	**6**	**1**	**3**

Pesticide Use, Storage, & Handling

#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are there trained scouts on staff other than the superintendent to monitor turf and plant health and pest populations regularly using a process to notify management of pest problems and organized into a report or guide so that they can be used for future pest control solutions?			✓
2	Are there written pest profiles of common pest species with a variety of potential control measures pre-evaluated including alterations in cultural management, biological, physical, and mechanical controls prior to treating the problem on the course?		✓	
3	Are there established and documented aesthetic and functional thresholds for all managed areas to effectively manage pest populations and reduce chemical use?			✓
4	Is there a specially designed pesticide mixing area where all mixing is performed by appropriately trained personnel?	✓		
5	Has a list of pesticides and other chemicals stored or used at the golf facility been provided to the appropriate Fire Department(s)?	✓		
6	Is there a written Integrated Pest Management Plan readily available and updated in use at the facility?			✓
7	If personal protective equipment is required for pesticide use, storage, or handling, is it available for use by trained individuals?	✓		
8	Are written and readily available records maintained of all applications of pesticides made by certified applicators, including the following? - the quantity of each pesticide used - the chemical or common name of the active pesticidal ingredient(s) (not the product name) - the pest or purpose for which the pesticide was applied --the date and place of application.	✓		
9	Is the chemical storage structure/area locked, well ventilated, fire proof, and access is limited to select personnel?	✓		
10	Are food storage and prep areas properly cleaned to reduce the likelihood of pest infestations and required pesticide applications?	✓		
	Point totals for each column - Response percentage	**6**	**1**	**3**

Pollution Prevention

#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are there designated "no-mow" areas (other than ponds) and "no spray zones" and buffer areas around pond, river, stream, or lake edges and have they been communicated to mower operators and pesticide applicators?	✓		
2	Has the Installation Spill Plan been amended to include the golf course facility and is there a spill containment kit at each required location and are spill containment procedures in place?	✓		
3	Does the chemical storage area have a sealed metal or concrete floor and are all pesticides handled over an impermeable surface?	✓		
4	Does the chemical storage area have a lip along the edges to contain spills?	✓		
5	Are liquid products stored below dry products and are dry materials stored on pallets or shelves to keep them off the floor?	✓		
6	Have all the golf facility employees regularly received documented and approved HAZCOM and safety and health training?	✓		
7	Are grass clippings blown off equipment with compressed air instead of or prior to washing?		✓	
8	Are gasoline, motor oil, brake and transmission fluid, solvents, and other chemicals used to operate or maintain equipment and vehicles prevented from directly or indirectly entering water bodies?		✓	
9	Has the watershed in which the course resides and contributes runoff to been identified and mapped to aid the golf course staff in the management of their facility?		✓	
10	Are appropriate quantities of fertilizers applied during weather conducive to reducing the potential for leaching and runoff?	✓		
	Point totals for each column - Response percentage	**7**	**3**	**0**

Conservation Practices

#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are recycling containers conveniently provided for customer and employee use throughout the golf course facility?			✓
2	Are there officially and appropriately designated minimally maintained areas on the golf course facility grounds?	✓		
3	Has the irrigation system or its components recently been upgraded to reduce inefficiency, malfunction, and overall water use?			✓
4	Has all "non-target" irrigation (ponds, natural, or out of play areas, etc.) been eliminated or minimized?	✓		
5	Have flow meters been installed to monitor water use and detect potential waste?	✓		
6	Has the entire golf course facility property been examined for critical habitats, threatened or endangered species, wetlands, floodplains, and historical/cultural resources?	✓		
7	Are employees encouraged to minimize their trips around the course to conserve on the use of fossil fuels?			✓
8	Does the snack bar utilize reusable plates and silverware for use by customers throughout the facility's operating hours?			✓
9	Have all potential "no-mow" area maintenance practices been coordinated with the installation BASH officer and environmental management personnel?			✓
10	Are all motorized golf course equipment checked regularly for excessive air polluting emissions?	✓		
	Point totals for each column - Response percentage	**5**	**0**	**5**

Water Resources

#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are water features regularly monitored for algae, erosion, excessive aquatic plant growth, fish kills, and sedimentation?	✓		
2	Are wash and wastewater kept from making direct contact with surface water and are they recycled or allowed to filter through a vegetative area when cleaning and maintaining equipment?	✓		
3	Outdoor irrigation of non-golf course landscape areas are regularly monitored and maintained for leaks and efficient performance?	✓		
4	Has the golf course staff coordinated with stormwater management planning requirements from the installation's environmental staff?			✓
5	Have part circle irrigation heads been installed where possible to preserve water resources and reduce maintenance while minimizing potential negative impacts to surrounding minimally maintained areas?	✓		
6	Are all water feature maintenance tasks coordinated with the installation natural resource manager and bird/wildlife aircraft strike hazard officer?			✓
7	Has the irrigation system been completely checked for proper water distribution in all irrigated areas and are water leaks fixed in a timely manner?			✓
8	Are moving water bodies such as streams or creeks that pass through the golf course regularly monitored for water quality both upstream and downstream of the course?		✓	
9	If required, does the facility have a Drought Management Plan written, ready, and available if, or when, irrigation restrictions may be instituted and required by the community or the installation?			✓
10	Are water quality problems immediately reported to supervisors or regulatory agencies (if required) for appropriate action?	✓		
	Point totals for each column	**5**	**1**	**4**

Maintenance Practices

#	Environmental Compatibility Indicator	Yes	Partial	No
1	Is there a written, regularly updated, and readily available Golf Course Maintenance Plan?		✓	
2	Does the Maintenance Plan include individual plans to include Integrated Pest Management, Tree Management, Hazard Communication, Drought Management, Water Feature Management, and a Site-Specific Spill Prevention Response Plan?		✓	
3	Are green, tee, and fairway mowing heights maintained at reasonable levels without continually stressing turf or maximizing chemical inputs?	✓		
4	Are there regular procedures in place to continually improve soil health such as topdressing, organic amendments, aeration, and drainage?	✓		
5	Is there a map of the course's "hot spots" requiring special care or regular attention?			✓
6	Is all maintenance equipment maintained and cleaned in a manner that eliminates the potential for spreading of pest or disease contamination?	✓		
7	Has there been a complete examination for potential negative environmental impacts of all aspects of the golf course facility operation including the snack bar and grill, clubhouse, pro shop, and maintenance complex?	✓		
8	Is contour mowing used to conserve fuel and increase playability and aesthetics?	✓		
9	Have all playing surfaces been inventoried and mapped for soil types including soil structure, nutrient levels, organic content, compaction, and water infiltration?			✓
10	Are soil tests and plant tissue analysis used to determine nutritional requirements?	✓		
	Point totals for each column - Response percentage	**6**	**2**	**2**

Customer Relations & Education

#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are the course manager and superintendent involved in a regularly updated, documented, and on-going customer educational program?			✓
2	Is there a conveniently located and highly visible place at the course or clubhouse where golf course environmental management notices and informational messages are regularly posted for customers?			✓
3	Do the course manager and superintendent actively communicate with customers to determine and document their points of view?		✓	
4	Is there active and regular communication with the golf management staff, civil engineering, environmental management, the Services manager, and commanders by course management?	✓		
5	Does the golf staff regularly survey their customers on how they rate the various elements of the golf course facility?			✓
6	Is there consistent and attractive signage around the course and grounds that would increase the awareness of the average golfer to the environmental management practices employed?			✓
7	Are there signs appropriately located to warn golfers of hazards when drinking reclaimed or otherwise non-potable water?	✓		
8	Are there interpretive signs posted to highlight key habitats or have appropriate areas been designated "Environmentally Sensitive Zones" per USGA rules?			✓
9	Are course staff members trained regularly on how to improve their dealings with customers?	✓		
10	Are there clinics provided to teach beginning golfers the basics of the game and to teach all levels of golfers the rules of the game?	✓		
	Point totals for each column	**4**	**1**	**5**

Miscellaneous Special Projects & Activities

#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are there projects planned and funded for the near future that would demonstrate the compatibility of the course's management methods with protection of the environment?	✓		
2	Are there projects planned and funded to reduce the course's potential negative environmental impacts?	✓		
3	Are there tournaments or other events planned that may educate customers on the environmental challenges faced by the golf staff at this installation?			✓
4	Are there regular field trips for local students or other local community groups hosted at the course?			✓
5	Are there projects planned to eliminate or minimize a potential erosion problem?			✓
6	Does the course have a native tree installation program complete with planting plan and maintenance schedule?			✓
7	Are any of the local schools or universities involved in educational or research activities at your course?			✓
8	Are there special facility-wide recycling programs underway?	✓		
9	Is your course an active participant in the USAF Golf Environmental Management Program?	✓		
10	Has your facility been nominated by your MAJCOM for the golf course environmental management award in the last 3 years?			✓
	Point totals for each column	**4**	**0**	**6**

ECQ Summary

#	Environmental Compatibility Quotient Category	Yes	Partial	No
1	Overall Management Philosophy & Documentation	5	3	2
2	Safety, Training, & Awareness	7	1	2
3	Compliance	6	1	3
4	Pesticide Use, Storage, & Handling	6	1	3
5	Pollution Prevention	7	3	0
6	Conservation Practices	5	0	5
7	Water Resources	5	1	4
8	Maintenance Practices	6	2	2
9	Customer Relations & Education	4	1	5
10	Miscellaneous Special Projects & Activities	4	0	6
	Composite point total/response percentage	**55**	**13**	**32**

GCEBA Results

✳ **Wrenwoods Golf Course, Charleston AFB, SC**
- **Actual ECQ (# of "Yes") = 55 "Just started"**
- **Potential ECQ (Actual ECQ plus "Partial") = 68 "Early stages"**

Conclusion

With the long-expected opening of the clubhouse and the remainder of the newly refurbished greens, Charleston AFB's Wrenwoods Golf Course is poised for a new beginning marked by record-level performance. The number of rounds should soar in as should overall customer satisfaction and perceived value. There may be a need for a concerted effort or even a little patience, to encourage the return of the majority of the old customers after the extended construction period. Once they do and get to experience the improvements for themselves, they should be back to stay. With this trying era behind them, Director of Golf, Karen Harrell, and Superintendent, Bob Spearman, can focus on new challenges like bringing the game to more youth and young Airmen as well as increasing the conditioning and attention to detail. Life is good in the low country!

Observations

- Need to compile and document actions already taken to create "continuity" document
- Implement planned improvements to all aspects of the golf facility management
- Utilize installation environmental management geographic information system and civil engineering digital aerial photographs for mapping requirements
- Need to secure computer hardware and software upgrades to increase overall efficiency and provide high speed internet access
- New clubhouse interior should be appointed with a location to present environmental information to customers
- Demonstrate genuine concern for player health and safety through actions
- Consider using AFCEE for on-site golf course environmental management training
- Do more than what is required
- Ensure ECAMP results are outstanding
- Regularly provide training for all employees on the specifics of pollution prevention and how they can help
- Continue building relationships with installation natural resources manager and other environmental professionals
- Provide detailed input to the scheduled update of installation integrated natural resources management plan (INRMP)
- Increase training and involvement of staff on integrated pest management procedures
- Compile written pest profiles of common pest species
- Improve water body care to eliminate unwanted vegetation while improving aesthetics and habitat

- Increase number of trained scouts on the maintenance staff
- Continue to involve installation youth through rules and instruction clinics
- Consider conducting field trips at the course for local school children
- Initiate Earth Day environmental awareness golf tournament
- Educate customers about the benefits of an environmentally friendly golf course
- Need to demonstrate dedication to "growing" the great game of golf to young airmen, other installation non-golfers, and youth

Areas needing improvement

The ECQ Summary on the previous page highlights the following areas for relative improvement at Altus AFB:

- Overall Management Philosophy & Documentation
- Conservation Practices
- Water Resources
- Customer Relations & Education
- Miscellaneous Special Projects & Activities

The gallery

This section of the report will be where some of the more revealing photographs (of the literally hundreds taken during the site visit) of pests, maintenance practices, and other areas where improvements may be made to create the best possible golf facility.

Tournament scoreboard will have to be replaced near new clubhouse.

One of the greens in the second phase of the renovation project.

The equipment wash rack is the only item lacking for maintenance staff.

Cart is parked nearby the potentially redesigned 1st or 10th tees.

Flow in streambed in front of 1st green is severely restricted.

Maintenance complex as seen from the course.

Landscape development on the 18th has not fared well.

Halfway house facility is in need of repair or replacement.

Detention basin was constructed parallel to drainage swale.

Several areas of the course have been designated for minimal care.

Environmental challenges

One of the important results of the GCEBA process is the identification of significant environmental challenges to be addressed in the long-term GEM Planning process. Ideally, the golf staff will address each issue from the best way to satisfy the goals of the golf facility and acceptable levels of course playability and customer satisfaction. The golf staff's preferred management approach for these issues should then be coordinated with the installation's environmental staff for refinement, coordination, and approval.

The GEM Plan would then consist of the environmental challenges, the approach to their management, a map showing where these challenges occur on the golf course, a booklet that describes the mapped challenges, goals and objectives for future years, and a set of best management practices.

The following environmental challenges were identified during the GCEBA process at Wrenwoods Golf Course, Charleston AFB, SC:

- Solid Waste Management Units (SWMUs)
- Wetlands
- Bird/Wildlife Aircraft Strike Hazard (BASH)
- New clubhouse site plan
- Floodplains

PAT study site plan shows new driving range located over SWMU 68.

SOLID WASTE MANAGEMENT UNITS (SWMUs)

According to installation environmental staffers, there are several SWMUs located on or near the golf course. Three are inactive landfills, SWMU 66, 67, & 68. These landfills were used to dispose of general refuse and possibly small amounts of industrial wastes.

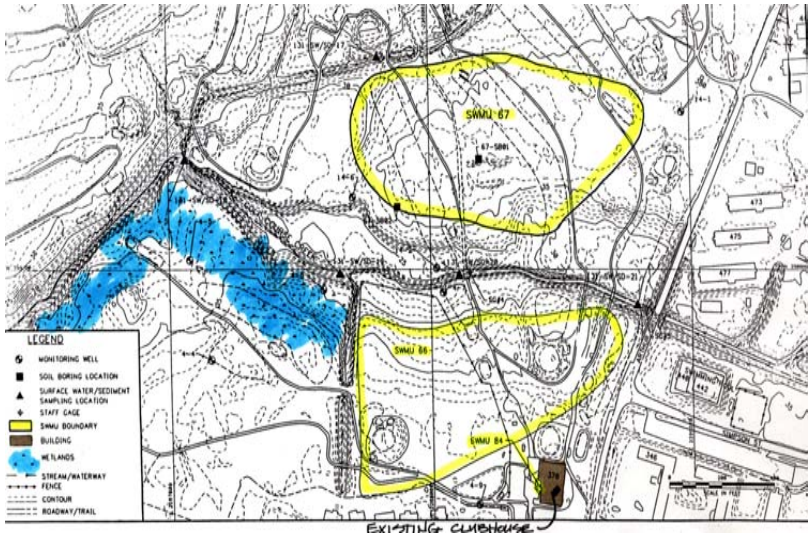
SWMU 66 is located near the 9th green through to the practice putting green where refused was disposed of from 1953-55 totaling approximately 40,000 CY.

SWMU 67 is located north of SWMU 66 and is separated by the Golf Course Creek. Between 1956-58, nearly 70,000 CY total refuse.

SWMU 68 is located on the north end of the course near the 5th hole. Between 1959-68, approximately 120,000 CY was dumped in this landfill. This area will be used as a portion of the new driving range landing area per suggestions of the May 2000 AFCEE Planning Assistance Team (PAT) visit. See http://www.afcee.brooks.af.mil/ec/golf/docs/charlestonclubhousesitingstudy.ppt for PAT results.

SWMU 118 was an equipment wash rack and is located on the west side of the Wrenwoods maintenance complex facility.

SWMU 84 is an oil/water separator and is located on the west side of the existing clubhouse. In the past, this unit received discharges from a grease trap in the snack bar. Current discharges are water from an ice machine through a floor drain.



Map shows SWMU and wetlands locations near the existing clubhouse.

Wetlands in the making….

WETLANDS

According to the INRMP, there are a total of 30 wetlands were identified and delineated at Charleston AFB totaling 354 acres installation-wide. The wetland delineations were completed in 1997 and all but two of the 30 wetlands occurring on Charleston AFB properties are forested. All of the wetlands have been at least moderately disturbed (by logging, minor fill at the wetland/upland boundary, or ditching), and phosphate strip mining has historically profoundly disturbed some installation wetlands.

The golf course waterways should be freed of excess vegetation so that stormwater flows are maintained and new wetlands are not slowly being created.

BIRD/WILDLIFE AIRCRAFT STRIKE HAZARD (BASH)

Although the BASH Plan appendix to the INRMP does not list the golf course as a potential contributor to the situation at Charleston AFB, the golf staff should consider becoming an active member of the Bird Hazard Working Group. Regular participation at the group meeting by the Wrenwoods GC staff is highly recommended as there are several water bodies on the course that could possibly function as an attractant to unwanted water fowl. More importantly, it would demonstrate the staff's dedication to supporting the mission while keeping them abreast of the vagaries associated with this important environmental challenge.

Streams abound at Wrenwoods Golf Course.

Stormwater detention basins are too close to clubhouse and will be hard to maintain in attractive and mosquito-free manner.

NEW CLUBHOUSE SITE PLAN

The new clubhouse siting is working extremely well. Construction was nearing completion with the grand opening tentatively set for late Sep 04. As is the case way too often, the landscape development of the site was eliminated in the bid process. Little to no improvements except for asphalt paths for pedestrian and cart circulation will be provided. The overall long-term functionality of the facility is paramount to its success. Every effort should be put forth to ensure that the landscape development of the site be completed in a timely manner. AFCEE/TDE could be a potential source for the expertise in completing this process.

FLOODPLAINS

According to the INRMP, Charleston AFB is located between the Ashley and Cooper Rivers outside the 100-year floodplain of both rivers. The closest 100-year floodplain boundary lies 1,200 feet off base and downstream of Golf Course Creek. Although there are no officially designated floodplains within Wrenwoods Golf Course, the potential for flooding is still high. Several waterways, including Golf Course Creek, cross the golf course grounds. Positive drainage is imperative. Unfortunately, since the installation has minimal slope throughout, this is not an easily achievable goal.

Many of Wrenwoods' waterways are clogged with vegetation.

Stormwater rushing out of a housing area upstream from the golf course is beginning to cause significant erosion on the 8th hole.

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Bibliography

Audubon International, Environmental Performance Audit, *Integrated Environmental Management*, Golf Course Superintendents Association of America, February 2000, New Orleans, LA.

The Center for Resource Management, *Golf & the Environment: Charting a sustainable future*. Environmental Principles for Golf Courses in the United States, 1996, Salt Lake City, UT.

Zapata Engineering, *Environmental Assessment, Construct New Wrenwoods Golf Course Clubhouse*, Charleston Air Force Base, June 2001.

Entomology, Charleston AFB, SC, *Pest Management Plan,* Aug 03.

437 CES/CEV, *Hazardous Waste Management Plan*, Charleston AFB Instruction 32-7042, 1 Jan 04

437 CES/CEV, *Solid Waste Management Unit Site Summary*, Jul 04.

Wrenwoods Golf Course Management, *Wrenwoods 'E' Newsletter*, 15 Jun 04.

Boehm, Rick, HQ AFSV/PAR, *Maintenance Report, Wrenwoods Golf Course*, Charleston AFB Golf Course Staff Assistance Visit, 1-4 Jun 04.

437 SVS, ECAMP Corrective Action Plan, Charleston AFB, SC, Mar 04.

AFCEE, Golf Clubhouse Siting Study, Planning Assistance Team, Charleston AFB, SC, May 00.

Air Force Center for Environmental Excellence
Technical Directorate
Environmental Science Division

For additional assistance or more information, please contact:
William H. Bushman – 210-536-3719 - DSN 240-3719
AFCEE/TDE, 3300 Sidney Brooks, San Antonio, TX 78235-5112
bill.bushman@brooks.af.mil

Please visit our Golf Course Environmental Management Program website:
http://www.afcee.brooks.af.mil/ec/golf/